11 PROJECT CONTROLLING

Project controlling is the process of taking established requirements and baselines, and ensuring they are monitored and compared with actual and planned performance.

Several important over-arching project requirements are established when the DOE prepares and awards contracts that initiate activities associated with a project. The preparation, award and management of these contracts are an important and continuous DOE function. This effort is discussed in Section 11.1.

Preliminary order of range estimates for a project are initially established and approved at CD-1, and are further defined and formalized at CD-2. Control of APBs and performance baselines are also an important DOE function that continues throughout project performance and closeout. This effort is discussed in Section 11.2.

Project interfaces are an area of project activity that is vital to the success of a project, and too often not given adequate attention. This activity includes the identification, control and management of all project interfaces with other projects and non-project activities and entities. This effort is discussed in Section 11.3.

11.1 Contract Management

All DOE projects are governed and controlled through contracts. This includes the contract between the DOE and the prime contractor(s) as well as those contracts between the project and the contractors/subcontractors that provide goods and services. Contracting begins early in a project's life, when the IPT is assembled and the focus is on developing the MNS and AS. Although many individuals play key roles throughout a project's life, the two most important individuals related to contract management are the PM and CO. The CO is the legal entity for all contract focus, including approval of contract changes. The PM has the ultimate responsibility for project success and is accountable for all project contracts. Additionally, the PM is generally identified as a COTR, and as such may act as the CO in technical contractual matters. Under all circumstances, the PM, CO, and the IPT work together openly and constructively in fulfilling their roles through the project acquisition process. There are many facets of contract management, therefore, the PM needs to be particularly well-trained and experienced to effectively accomplish Government commitments.

11.1.1 Integrating Project and Performance-Based Contracting

Substantial requirements and guidance is available throughout the Federal Government. A snapshot follows on how to integrate the desired, increasing focus on performance-based acquisition. As taken from FAR 2.101:

"Performance-based contracting (PBC)" means structuring all aspects of an acquisition around the purpose of the work to be performed with the contract requirements set forth in clear, specific, and objective terms with measurable outcomes as opposed to either the manner by which the work is to be performed or broad and imprecise statements of work."

FAR 37.6 identifies five elements of PBC, they are; (1) Statements of Work, (2) Quality Assurance, (3) Selection Procedures, (4) Contract Type, and (5) Follow-on and Repetitive Requirements. At a high level, these are the activities that need to be developed, planned, and executed successfully within a given project and its procurements. From a project perspective, these elements are part of the plans and decision processes that are required as part of various project activities.

In PBC, as discussed in Section 1.2.4, the project-phased activities and CDs are designed to carry out these required activities, as well as others that are necessary to effectively deliver a new materiel asset. Projects are made up of potentially numerous procurements. These procurements are to be integrated into the activities and decisions that are made by the Government during contracting, and after a contract is in place. For the DOE, this can at times get blurred due to the substantial use of contractors that have broad scopes and provide or support the technical and managerial expertise required for DOE missions. Regardless of the starting point, both project management and PBC approaches are timeline-driven, and may have to run concurrently in some instances, depending upon the starting point of the mission need (in or out of an in-place contract). The following seven-step process is adapted from existing Government information on PBC. It is important to note, however, that IPTs need to be well-trained in PBC approaches and kept up-to-date in lessons learned experiences that may be incorporated, in real time, into any project undertaking.

Step 1 – Establish an IPT. This is sometimes referred to as an integrated solutions team, since their fundamental purpose is to find performance-based solutions to agency mission and program needs. This is a key step in all MNS development and specific requirements and guidance has been provided in this Manual.

Step 2 – Describe and develop the problem that needs to be solved, and links to the Department's Strategic Plan and objectives. Because a clearer, performance-based picture of the acquisition is to be the team's first step, it is not yet time to retrieve the requirements from former solicitations, search for templates, think about contract type, incentives, decide on the contractor or the solution. This effort results in the MNS and includes early preliminary planning documents such as the draft acquisition strategy, risk comparisons, and potential alternatives.

Step 3 – Examine the potential solutions from both private and public sectors. The entire IPT needs to understand and have a common understanding of what features (high-level objectives, functions, and constraints), schedules, terms and conditions are key to the potential solution. Picking a specific solution is to be resisted and adequate planning time

allowed to carry out the next two steps. This may include the entire project Definition phase (selecting, preparing and delivering the concept), or may be done during any phase as necessary to support a procurement. An example would be preparing for a conceptual design contract, technology development or a site characterization effort.

Step 4 – Develop a high-level performance work statement at CD-2, Approve APB, and include it in the PEP. This statement will satisfy the next step as well as the requirements of OMB A-11. Below this level, performance work statements and/or statement of objective documents are used as part of the request for proposals. For a large, complex project this may take multiple contracts, but for a simplified System Project (Section 4.2.1) it may be developed into one bid by a prime contractor and eventually bid and performed by a single contractor.

Step 5 – Decide how to measure and manage performance. Measuring and managing performance is a complex process and requires the consideration of many factors. For a project with a TPC between $5M and $20M, contract requirements need to be developed that require a PMS; and for projects having a TPC greater than $20M, a full EVMS is required that is in compliance with the national consensus standard, ANSI EIA-748.

Step 6 – Select the right contractor(s). Bringing the acquisition strategy to fruition by implementing the project AS and selecting the right contractor is especially important in PBC. The contractor is to understand the PBC approach, know or develop an understanding of the Department's requirements, have a history of performing exceptionally in the field, and have the processes (project, safety, engineering, quality, procurement, etc.) and resources in place to support the Department's objectives and requirements.

Step 7 – Managing performance. During the project phases of Execution and Transition/Closeout, all systems and plans are used to monitor, manage, and report performance. This is assisted by the three Critical Decisions (CD-2, -3 and -4), and includes appropriate reviews, performance measures, and reporting.

The above steps do not intend to highlight the entire project process—they are designed to help the PM and the IPT understand how to integrate the two concepts. PBC is a rapidly developing approach with numerous guides, web pages and training classes on the subject. Additionally, the Practice on contracting and procurement provides additional discussion, guidance, and references on contracting and PBC.

11.1.2 Integrating Contractor Performance Data

The PM is responsible for incorporating the contractor's performance measurement data into the project's performance reporting system. The contractor's time-phased baseline budget is integral to the appropriate project cost accounts. The project's baseline budget should reconcile to the budgets in the contractor's baseline. The baseline schedule should reconcile with the project's master schedule. All contractor efforts should integrate with the project's WBS.

11.1.3 Review and Analysis of Contractor's Performance Data

The PM is responsible for performance analysis of the contractor's performance data using the information provided in the contractor's monthly performance reports. The PM may use

members of the contractor's management team to review and analyze the contractor's performance reports. The PM should plan and perform regularly scheduled performance reviews with the contractor.

11.1.4 Contract Closeout

Upon completion of a contract's scope of work (as reported by the contractor), the PM should review the work performed against the scope of work planned (plus any changes) to verify satisfactory completion. Upon verifying completion, the PM notifies the Program Manager and the CO.

11.2 BASELINE CHANGE CONTROL

Baseline Change Control (BCC) ensures that project changes are identified, evaluated, coordinated, controlled, reviewed, approved and documented in a manner that best serves the project. Errors, problems, opportunities, new management, or the availability of new methods or tools can trigger project changes. Uncontrolled changes lead to chaos due to the far-reaching effects that even small changes can have on the project's technical, schedule, and cost baseline, as well as effects on safety, risk, quality, and products.
An approved project APB (see Manual Chapter 8 and the Practice on APB) is the highest controlling element of a project. Controlling changes within an APB should be an inherent element of project management that is directly related to the risks and uncertainties associated with a project. One key goal of BCC is to ensure APB threshold values are not exceeded. BCC provides a system to approve and document project changes within the threshold values of an APB and allow for management of the objective values of the APB. Project changes should be identified, controlled, and managed through a traceable, documented, and dedicated change-control process. **Project changes must be identified, controlled, and managed through a traceable, documented, and dedicated change-control process that is defined in the PEP and consistent with Table 2-3.** The goals of a baseline change-control process include:

- Anticipate, recognize and predict changes.
- Prevent APB breaches.
- Evaluate and understand the impacts of each change.
- Identify, understand and control the consequences of changes.
- Prevent unauthorized or unintended deviations from approved baselines.
- Assure each change is evaluated, reviewed, and dispositioned at the proper management level.

11.2.1 Controlling Baseline Changes

Baseline change control is to be established early in a project's life cycle, and as a minimum, be formal, organized, and functioning prior to requesting CD-2. Thus, the PM institutes a formal, demonstrable change control process to control changes to these

baselines prior to submitting a request for CD-2 approval. A key responsibility of each PM involves controlling changes to project baselines.

The objective of the change control process is to ensure that changes are documented and formally resolved. Documenting and controlling change provides better mitigation, is necessary for EVMS and for accurate performance reporting and supports better management decision-making. The change control process is not intended to simply prevent changes, but ensures change control review and documentation. Therefore, changes are managed and controlled (as other project risks) by establishing a process for identifying, evaluating, and dispositioning change requests.

11.2.2 Change Principles and Processes

Responsibility for change control exists at every management level, and changes are monitored at the appropriate level by CCBs. However, regardless of the source or the seeming innocence of a change request, the PM should be ultimately responsible for assuring requested changes are documented, evaluated, processed, and dispositioned.

11.2.3 Input to Change Requests

A change control framework should be established or referenced in the PEP. The PEP also identifies the project baselines against which changes are monitored and controlled. Project baselines are to be continually compared against project performance and reported in monthly project performance reports.

Once a technical baseline has been established, formal, documented engineering change requests are the method of requesting changes. They should also be evaluated for impact on schedule and cost baselines and, if impacting, also processed through appropriate change control. However, during design, change requests may be used to document and disposition minor design errors/changes, and during construction, field change requests may similarly be used to disposition minor field errors/changes. These methods of initiating changes, however, should be monitored, controlled, and approved based on a tailored change control process. In addition, all such changes should be reflected in approved project drawings and specifications.

11.2.4 Change Control Board

Each organizational level (as appropriate and documented in the PEP) should establish a CCB for disposition of baseline change proposals within their level of authority/control. For the Secretary of Energy, the ESAAB may act as a CCB. A CCB includes, as a minimum, a chairperson, a secretariat, and members and advisors as needed. The CCB chairperson should be responsible for change decisions, and is the change approval authority. Members and advisors are on the CCB to advise the chairperson about technical matters involving quality, reliability, financial, schedule environmental, safety, health, and quality issues. Board meetings and decisions should be documented through meeting minutes and letters-of-decision. Procedures for establishing a CCB and defining the membership, authority, and operation of the Board should be included in the CCB charter or initiating document.

11.2.5 Control Levels

Four control levels govern baseline change control for DOE projects. Agreed upon thresholds limit the control each organizational element has over baseline change approval, and the change control process. The baseline objectives, APB threshold values, and associated change control thresholds for each project should be documented in the PEP, and approved at the CD-2 (APB) decision point.

All changes are inside the APB, if they exceed the KPP (cost and technical) of the APM it is to be handled as a breach. Level-1 for Under Secretaries and/or NNSA Administrator; and for Level-2 for the PASs. Level-3 typically resides with the Field, and Level-4 for the prime contractor.

11.2.6 Change Initiation

The initiator of a change proposal prepares the change request describing the change and identifying the amount of budget required or to be returned. The initiator also describes the scope of the change, any schedule impacts resulting from the change, and provides an analysis of the change. The analysis of a change should include the impact of the change on project technical, schedule, and cost baselines and/or forecasts, as applicable. Included in the technical category are items like safety, quality, procurement, performance, personnel, training, ongoing operations, and so forth. That is, the analysis is to be all-inclusive and thorough. A proven, structured approach for evaluating the impacts of a proposed change is obtained by completing a pre-established project change impact checklist for each change request. Change analysis and understanding is especially important during project Execution because of the large impact of seemingly small changes.

Each project should establish and maintain a change control log from which a unique number is assigned to each change request, and in which the title, scope and cost of the change is recorded, along with the disposition of the change and any assigned action items. If the change impacts project costs, then entries should also appear indicating the source of the funds needed to implement the change.

Often, a project change is caused by congressional action, such as an Appropriations Act that reduces funding. In such cases, the PM should prepare a project change request and submit it through normal channels for review and approval. The change should be documented and approved by the appropriate SAE/AE within three months from the time the congressional action is enacted (see Section 8.3).

11.2.7 Change Documentation

A significant amount of documentation is, by necessity, associated with a project's change control system. This includes the change request and the change impact evaluation form; the change log; the CCB meeting minutes, and decision documents; and any budget, funding, schedule, design, procurement, construction, safety, etc. documentation. These documents should be preserved as part of the project's historical record, and should be identified, reproduced, distributed, filed, and preserved in compliance with the project's configuration management system.

11.3 INTERFACE MANAGEMENT

All DOE projects have interfaces that should be managed. Typical interfaces include:

- Contracts/subcontracts
- Existing Site infrastructure
- Other projects
- Other Organizations
  - Congress
  - OMB
  - State Regulators
  - EPA
  - DNFSB.

Each of these interfaces could include:

- Communications
- Agreements
- Regulations
- Reviews
- Interface Drawings and Specifications
- Technical Requirements.

The PM is responsible for project interface management, and should exercise proper authority and control to assure proper management of each interface.

The objective of interface management is to ensure that structures, components, and organizations fit and function together properly to achieve project goals. Interface management is particularly important when system or component design is accomplished concurrently by different organizations, either internal or external. Interface management facilitates communication and understanding of technical requirements across internal and external boundaries.

Interface management is achieved by:

- Identifying interfaces and responsible parties to participate in interface development at the earliest stages of a project.
- Identifying interface type, functions, and physical characteristics.
- Identifying the functional and physical requirements and constraints of an interface.
- Employing a rigorous, disciplined approach for developing, approving, and controlling all interface documents.

The principles of interface management apply to both new, refurbishment, and modification projects. The major participants in interface management include the PM, the prime contractor's project manager, contractors/subcontractors and suppliers, other DOE organizations and other outside organizations.

11.3.1 Responsibilities

An interface involves at least two parties. Each party is responsible to check that their side of an interface integrates with the other side, and is also responsible to provide all information to define the interface. A lead organization (the interface owner) should be designated by management for specific interface definition and implementation actions. However, the PM is ultimately responsible for managing (or having managed) all project interfaces.

The organization (contractor, program, project, facility, DOE) that is responsible for a system, subsystem(s), physical component(s), or interfacing activity within a defined system (or project) is the owner of all interfaces associated with those components. System responsibility during the various project life cycles should be defined by the PM and communicated to all participants so there is no misunderstanding. As the interface owner, such organizations are responsible for defining all interfaces and ensuring that interfaces are fully developed and integrated with other system interfaces, as delegated by the PM.

The interface owner is responsible to:

- Prepare all documentation to fully develop and integrate identified interfaces. This may include preparing interface control documents/drawings and/or contract modification packages for external interfaces.
- Ensure that all interface control documentation is reviewed by the appropriate organizations and the CO.
- Establish temporary interface working groups as needed.
- Approve final documentation and releases approved documentation in accordance with release procedures.

Typically, interface control working groups are organized to work on external and internal interfaces to ensure that interface information is fully developed and integrated with the project baselines and contract documentation, as appropriate.

11.3.2 Identify Interfaces

The PM is ultimately responsible for identifying project interfaces, assuring each interface is assigned to a responsible individual for coordination/resolution, documenting activities on each interface, and tracking interface activities to assure none will adversely impact the project. **All necessary interfaces must be documented using appropriate interface documents.**

The organization assigned responsibility for an interface should identify, document and categorize the interface appropriate to the project stage of development and the type of interface. For example, internal or external; organizational or physical; contractual or non-

contractual; company-to-company; organization-to-organization; system-to-system; system-to-component; etc.

Interfaces should be documented using appropriate interface documents as determined by the PM. ICDs are used for physical interfaces, and MOUs or other written agreements are used for organizational interfaces. Once documented and approved, the interface information is integrated into the project database and maintained under change control. As interfaces are identified, they are categorized, as appropriate.

11.3.3 Develop Interface Control Documentation

The organization responsible for the interface categorizes interface information as either physical (systems, subsystems, components) or organizational and defines organizations having common interfaces. The level of definition will vary, but may be adequate to allow all parties involved in the interface to develop the work scope needed to fully define the interface and develop the appropriate level of interface documentation as described in the following paragraphs:

- Internal interfaces are either physical or organizational interfaces. These interfaces are documented to support design (drawings, specifications) and operations.
- External interfaces are either physical or organizational interfaces with other contractors. These interfaces are controlled and managed through an appropriate level of contract administration and technical documentation. Establishing and/or changing external interfaces requires the use of a contract modification. The contract modification documentation should establish responsibilities, agreements, and configuration item information. The contract modification documents are developed by all parties to an interface and when approved represent authorized contract work scope and deliverables between the companies. The various interface description documents used for internal interfaces can be used to develop external interfaces.
- Interface control drawings describe design features on both sides of an interface boundary to the extent required to control physical, functional, and operational compatibility between the affected equipment items and facilities.
- Engineering drawings that contain requirements controlled by an interface control drawing/document should be consistent with the interface boundaries and features contained in the interface control drawings/documents. Engineering drawings provide traceability to the interface control drawing/document.
- Engineering drawings contain the interface boundary identification, when required.
- The “owner” of the interface should establish an agreement upon the list of ICDs as part of the PEP, and should prepare such documents that will be eventually provided to the user on a checklist.
- Interface control drawings are prepared when required. The information to be included on such drawings includes: (a) general configuration, dimensional data, location data, weights and measures, etc.; (b) mechanical, electrical, hydraulic, pneumatic, optical

characteristics; and (c) other characteristics that cannot be changed without changing the item design or function.

11.3.4 Review and Approve Interface Documents

All documents prepared in support of interface management may be reviewed and approved per project procedures, entered into the project's document control system, maintained under change control, distributed to appropriate project participants, and included in final project document turnover.

11.3.5 Closeout

Each project interface is managed (controlled, assigned, tracked) until completed (closed). Closeout is documented through a closeout form signed by the PM as well as the assigned responsible person. All closeout documents become part of the project's permanent documentation and are provided at turnover.

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Appendix A GLOSSARY

The following is a list of definitions of terms that are unique or nearly unique to project management. Also included are terms that are not unique to project management, but are used differently or with a narrower meaning than in general everyday usage. Many of the terms have broader, or sometimes different, dictionary definitions.

Acceptance Testing. The performance of all testing necessary to demonstrate that installed equipment and/or systems will operate satisfactorily and safely in accordance with plans and specifications. It includes hydrostatic, pneumatic, electrical, ventilation, mechanical functioning, and run-in tests of equipment, portions of systems, and finally of completed systems. (DOE 4700.1, chg. 1)

Accrued Cost. Amounts owed for items or services received, expenses incurred, assets acquired, or construction performed, for which a bill (e.g., progress billing, and other billings) has not yet been received or approved. (DOE Cost Accounting Handbook)
In an earned-value context accruals represent cost (liability) for work performed, and thus costs incurred, for the reporting period even though the bills have not yet been received. Thus accruals are included in the Actual Cost of Work Performed (ACWP) when reporting performance in the earned value system. It is essential that the accrual methodology be consistent with the time phasing of the Budgeted Cost of Work Scheduled (BCWS). Note that the time phased BCWS should be consistent with the contractual obligations for procurement of goods and services.

Accountability. The requirement, obligation, or willingness of an individual to accept responsibility for the outcome, results and consequences of their actions and decisions. In a project setting, accountability is inseparable from authority and responsibility.

Accountability Matrix. See RESPONSIBILITY ASSIGNMENT MATRIX.

Acquisition Executive (AE). The individual designated by the Secretary of Energy to integrate and unify the management system for a project, and monitor implementation of prescribed policies and practices. Approves the initiation of a major system project (or a selected other project) and its transition through phases of the acquisition process and other sub-phases involving major commitments. Selects from among competing systems those that are to be advanced to development, demonstration, and production/operation, and authorizes development of a noncompetitive (single concept) system. (DOE 4700.1, chg. 1)

Acquisition Performance Baseline (APB). Includes all cost, schedule, and performance parameters (both objectives and thresholds) for a program/project. It represents the DOE commitment to Congress to assess Total Project Cost (TPC). Key elements in formulating an APB include the integration and assessment of program/project scope, schedule, and